



Illinois Department of Transportation

To: John Fortmann Attn: District One
From: John D. Baranzelli
Subject: Pavement Design
Date: September 9, 2014

A handwritten signature in black ink, appearing to read 'JDB', enclosed in a hand-drawn oval.

IL Route 38
DuPage County
At County Farm Road

The project, submitted to BDE by email memo dated September 2, 2014, will improve the interchange by providing EB Dual LT lanes and a WB RT lane on IL 38. The Winfield Creek culvert will be replaced at Shaffner Road. Shaffner Road and County Farm Road will be partially reconstructed and resurfaced, and are local jurisdictions. Both intersections with IL 38 are considered "High Stress", due to MU ADT exceeding 200 vehicles. The district is proposing a rigid design, but if the locals request HMA for their roadways, it will be accommodated. Based on the LCCA, the rigid pavement design exceeds 10% for both IL 38 and the intersecting roadways. The approved pavement design is as follows:

IL 38 and County farm Road (Pavement Reconstruction)

9.5 inches of PCC Jointed Pavement with tied PCC Curb & Gutter
12 inches of Aggregate Subgrade Improvement

Shaffner Road (Reconstruction)

7.5 inches of PCC Jointed Pavement with tied PCC Curb & Gutter
12 inches of Aggregate Subgrade Improvement

Pavement Resurfacing

Cold Milling of Existing HMA Pavement

2.5 inches minimum (more if Necessary)

1.75 inches of Polymerized HMA Surface Course, Mix "F", N90

0.75 inches of Polymerized Leveling Binder (Machine Method), IL-4.75, N50

IL 38 (Temporary Pavement)

Option 1

10 inches of Full Depth Temporary HMA Pavement
2 inches of HMA Surface Course, Mix "D", N50
8 inches of HMA Binder Course, IL-19.0, N50
4 inches of Subbase Granular Material, Type B (CA-6)

Option 2

8 inches of Temporary PCC Pavement
4 inches of Subbase Granular Material, Type B (CA-6)

If you have any questions, please contact Paul Niedernhofer at (217) 524-1651.



Illinois Department of Transportation

Memorandum

To: John D. Baranzelli

Attn: Paul Niedernhofer

From: Jose A. Dominguez

By: Melchor Mangoba / Ojas Patel

Subject: Pavement Analysis*

Date: September 2, 2014

*Route: IL 38

Limits: at County Farm Road

Section: GY-N-1

Current target: 06CY15

County: DuPage

Contract No.: 60W11

Job No.: D-91-177-13

We have completed the pavement analysis for the above captioned location. Review by the Central Office is required since the total pavement area for reconstruction exceeds 4,750 Square Yards. The following is the scope of the project:

IL 38 – Reconstruction to provide EB Dual LT lanes and WB Right turn lane at intersection with County Farm Road. Replacement of Winfield Creek culvert at Shaffner Road. Resurfacing at east and west limits.

Shaffner Road and County Farm Road – Reconstruction and portions resurfacing.

IL 38 at County Farm Road and at Shaffner Road are considered "High Stress" intersections since the design lane MU ADT exceeds 200 vehicles. District 1 recommends rigid pavement. However, if the municipality elects to use HMA, we recommend using Mix "F" N90 at "High Stress" intersections. Either selection is preferred to be built at a minimum 150 feet back from the location of the stop bar.

A 20-year pavement analysis was performed on the above segments. We recommend a mechanistic-rigid pavement design based on the life cycle cost analysis which favors PCC pavement by 11.2% on IL 38 and 11.0% on Shaffner Road. Our recommendation is as follows:

IL 38 and County Farm Road¹⁰

Reconstruction

PCC Curb and Gutter (Tied)

9 ½" PCC Pavement¹

12" Aggregate Subgrade Improvement³

Shaffner Road¹⁰

Reconstruction

PCC Curb and Gutter (Tied)

7 ½" PCC Pavement²

12" Aggregate Subgrade Improvement³

Pavement Resurfacing

Cold Milling of Existing HMA Pavement⁶

2 ½" Minimum (more if necessary)

1 ¾" Polymerized HMA Surface Course, Mix "F", N90⁴

¾" Polymerized Leveling Binder (Machine Method), IL-4.75, N50⁵

Temporary Pavement (IL 38)

Option 1⁷

Temporary Pavement

10" Full Depth Temporary HMA Pavement⁸

2" HMA Surface Course, Mix "D", N50

8" HMA Binder Course, IL-19.0, N50

4" Subbase Granular Material Type B (CA-6)⁹

Option 2⁷

Temporary Pavement

8" Temporary PCC Pavement⁸

4" Subbase Granular Material Type B (CA-6)⁹

¹Designer Note 1: Use pay item 42000411, PORTLAND CEMENT CONCRETE PAVEMENT 9 ½" (JOINTED), paid for in square yards.

²Designer Note 2: Use pay item 42000211, PORTLAND CEMENT CONCRETE PAVEMENT 7 ½" (JOINTED), paid for in square yards. Transverse contraction joints should be reduced to a maximum of 14 foot spacing for 9" PCC pavement.

³Designer Note 3: Use pay item **30300112, AGGREGATE SUBGRADE IMPROVEMENT, 12"**, paid in square yards.

⁴Designer Note 4: Use pay item **40603595, POLYMERIZED HOT-MIX ASPHALT SURFACE COURSE, MIX "F", N90** paid for in tons.

⁵Designer Note 5: Use pay item **40600827, POLYMERIZED LEVELING BINDER (MACHINE METHOD), IL-4.75, N50** paid for in tons.

⁶Designer Note 6: Refer to the District One, Bureau of Materials' "Hot-Mix Asphalt – Mix Selection" tables to determine the corresponding HMA mix table requirements for the plans.

⁷Designer Note 7: The contractor shall have the option of constructing either material type if both Portland cement concrete and HMA are shown in the plans. For quantity estimation purposes, excavation quantities should be estimated assuming the thicker design if both options are shown in the plans.

⁸Designer Note 8: Use pay item **Z0062456, TEMPORARY PAVEMENT**, paid in square yards.

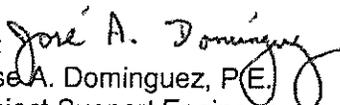
The HMA temporary pavement shall consist of two items, HMA binder course and HMA surface course. Include both items in the HMA mix table requirements.

When PC Temp Pavement is used as an option, the following note shall appear on the plans adjacent to the HMA mix table: "PC Concrete temporary pavement shall consist of Class PV Concrete meeting the requirements of Art.1020 of the Standard Specifications. Temporary PCC pavement does not require dowel bars.

⁹Designer Note 9: Use pay item **31101200, SUBBASE GRANULAR MATERIAL, TYPE B 4"**, paid in square yards

¹⁰Designer Note 10: County Farm Road and Shaffner Road are subject to local jurisdictional approval and concurrence.

If you have any questions or need additional information, please contact Ojas Patel, Pavement Design Engineer, at (847)705-4550.

By: 
José A. Dominguez, P.E.
Project Support Engineer

PROJECT AND TRAFFIC INPUTS (Enter Data in Gray Shaded Cells)

Route: IL 38 Comments: Phase II Coordination with BDE Required
 Section: GY-N-1 With higher TF, this design will be sufficient for the radius return portion on County Farm Road
 County: DuPage Design Date: 05/19/2014 ONP <-- BY
 Location: at County Farm Road Modify Date: <-- BY

	ADT	Year
Current:	37,700	2013
Future:	42,000	2040

Facility Type: Other Marked State Route
 # of Lanes = 4

Road Class: I

Subgrade Support Rating (SSR): Poor
 Construction Year: 2015
 Design Period (DP) = 20 years

Structural Design Traffic			
	Minimum ADT	Actual ADT	Actual % of Total ADT
PV =	0	37,274	94.1%
SU =	250	1,386	3.5%
MU =	750	951	2.4%
Struct. Design ADT =	39,611 (2025)		

		% of ADT in Design Lane	
		P =	S =
		32%	45%
			M = 45%

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT		RIGID PAVEMENT	
Cpv =	0.15	Cpv =	0.15
Csu =	132.5	Csu =	143.81
Cmu =	482.53	Cmu =	696.42
TF flexible (Actual) =	5.82 (Actual ADT)	TF rigid (Actual) =	7.79 (Actual ADT)
TF flexible (Min) =	3.56 (Min ADT Fig. 54-2.C)	TF rigid (Min) =	5.02 (Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement	JPC Pavement
Use TF flexible = 5.82	Use TF rigid = 7.79
PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.R)	Edge Support = Tied Shoulder or C.&G.
HMA Mixture Temp. = 75.0 deg. F (Fig. 54-5.C)	Rigid Pavt Thick. = 9.50 in. (Fig. 54-4.E)
Design HMA Mixture Modulus (E _{HMA}) = 690 ksi (Fig. 54-5.D)	
Design HMA Strain (ε _{HMA}) = 73 (Fig. 54-5.E)	
Full Depth HMA Design Thickness = 11.00 in. (Fig. 54-5.F)	CRC Pavement
Limiting Strain Criterion Thickness = 14.75 in. (Fig. 54-5.I)	Use TF rigid = 7.79
Use Full-Depth HMA Thickness = 11.00 inches	IBR value = 3
	CRCP Thickness = 8.50 in. (Fig. 54-4.M)

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC	Unbonded Concrete Overlay
Use TF flexible = 5.82	Review 54-4.03 for limitations and special considerations.
HMA Overlay Design Thickness = 8.50 in. (Fig. 54-5.U)	
Limiting Strain Criterion Thickness = in. (Fig. 54-5.V)	
Use HMA Overlay Thickness = 999.00 inches	JPCP Thickness = NA inches

CONTACT BMPR FOR ASSISTANCE

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

Class I Roads	Class II Roads	Class III Roads	Class IV Roads
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500	2 lanes with ADT > 2000 One way Street with ADT <= 3500	2 Lanes (ADT 750 -2000)	2 Lanes (ADT < 750)

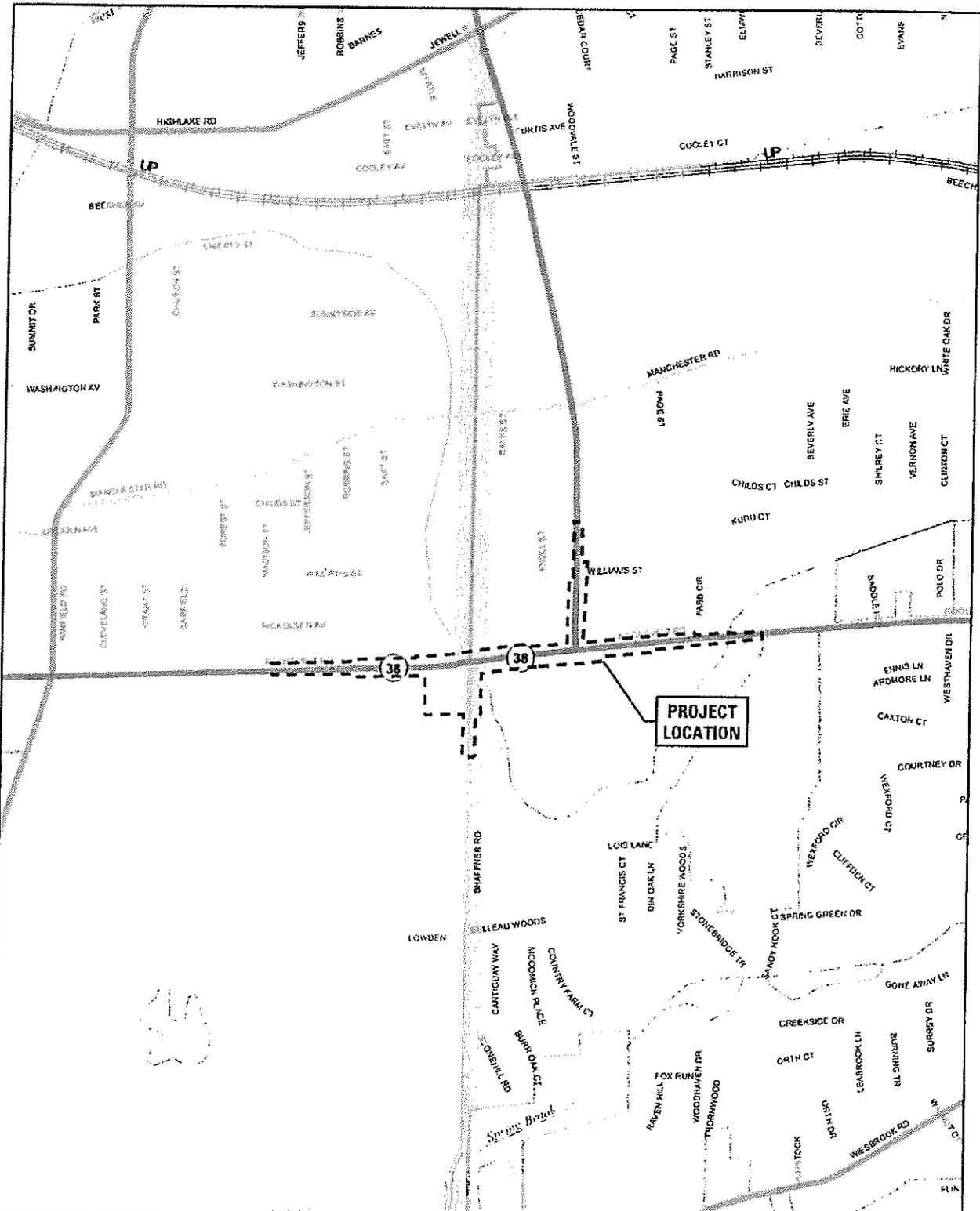
Facility Type	Min. Str. Design Traffic (Fig 54-2.C)		
	PV	SU	MU
Interstate or Freeway	0	500	1500
Other Marked State Route	0	250	750
Unmarked State Route	No Min	No Min	No Min

Class	Traffic Factor ESAL Coefficients			
	Rigid (Fig. 54-4.C)		Flexible (Fig. 54-5.B)	
	Csu	Cmu	Csu	Cmu
I	143.81	696.42	132.50	482.53
II	135.78	567.21	112.06	385.44
III	129.58	562.47	109.14	384.35
IV	129.58	562.47	109.14	384.35

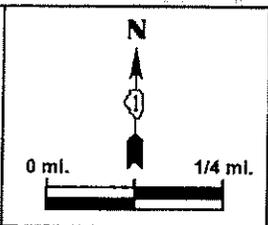
Number of Lanes	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B)					
	Rural			Urban		
	P	S	M	P	S	M
1 Lane Ramp	100%	100%	100%	100%	100%	100%
2 or 3	50%	50%	50%	50%	50%	50%
4	32%	45%	45%	32%	45%	45%
6 or more	20%	40%	40%	8%	37%	37%

Class Table for One-Way Streets	
ADT	Class
0 - 3500	II
>3501	I

Class Table for 2 or 3 lanes (not future 4 lane & not one-way street)	
ADT	Class
0 - 749	IV
750 - 2000	III
>2000	II



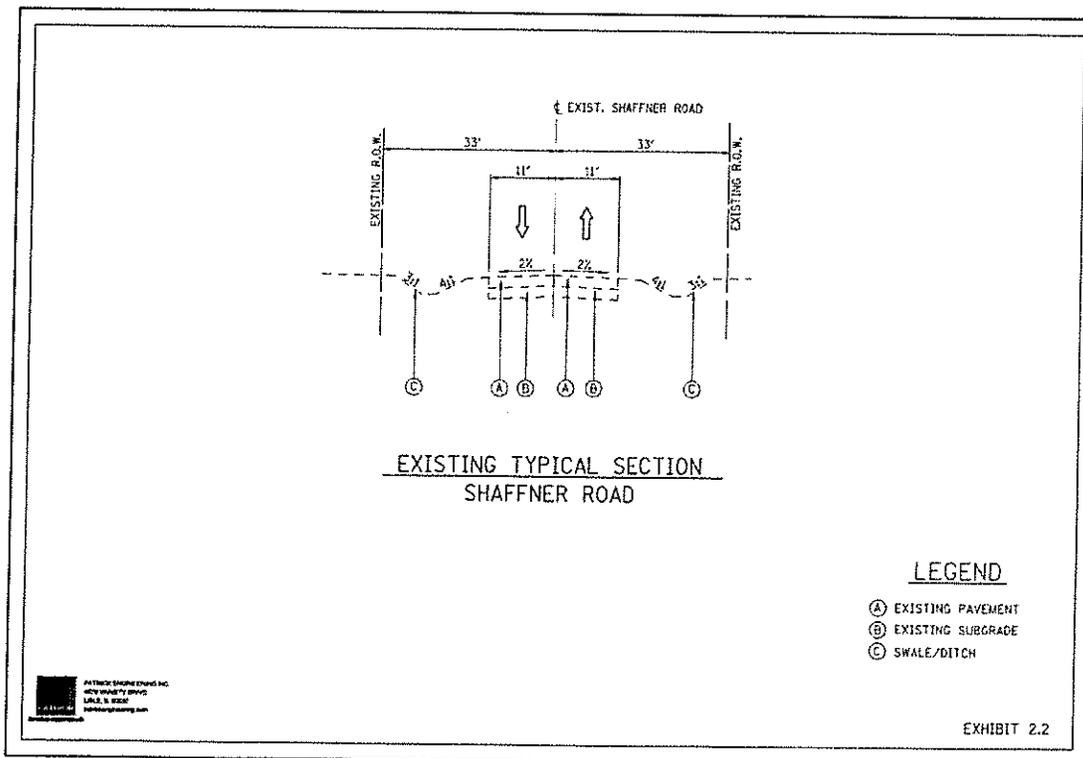
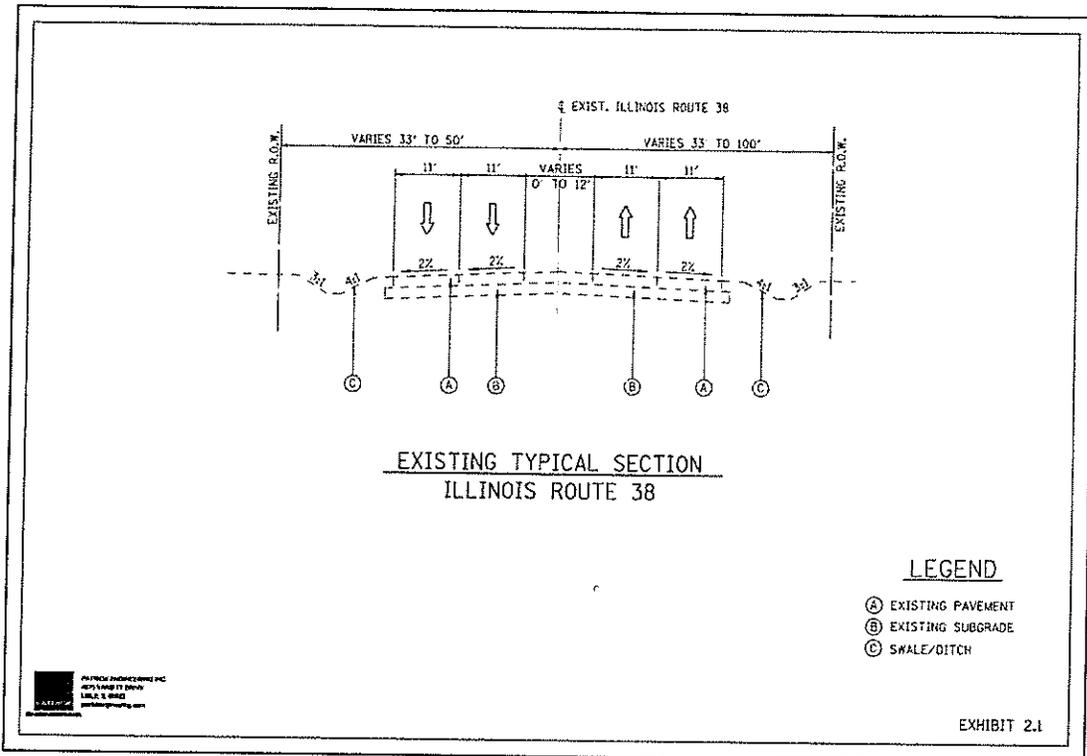

WILLS BURKE KELSEY ASSOCIATES LTD.
 110 West Main Street, Suite 201
 St. Charles, Illinois 60174
 (630) 443-7755

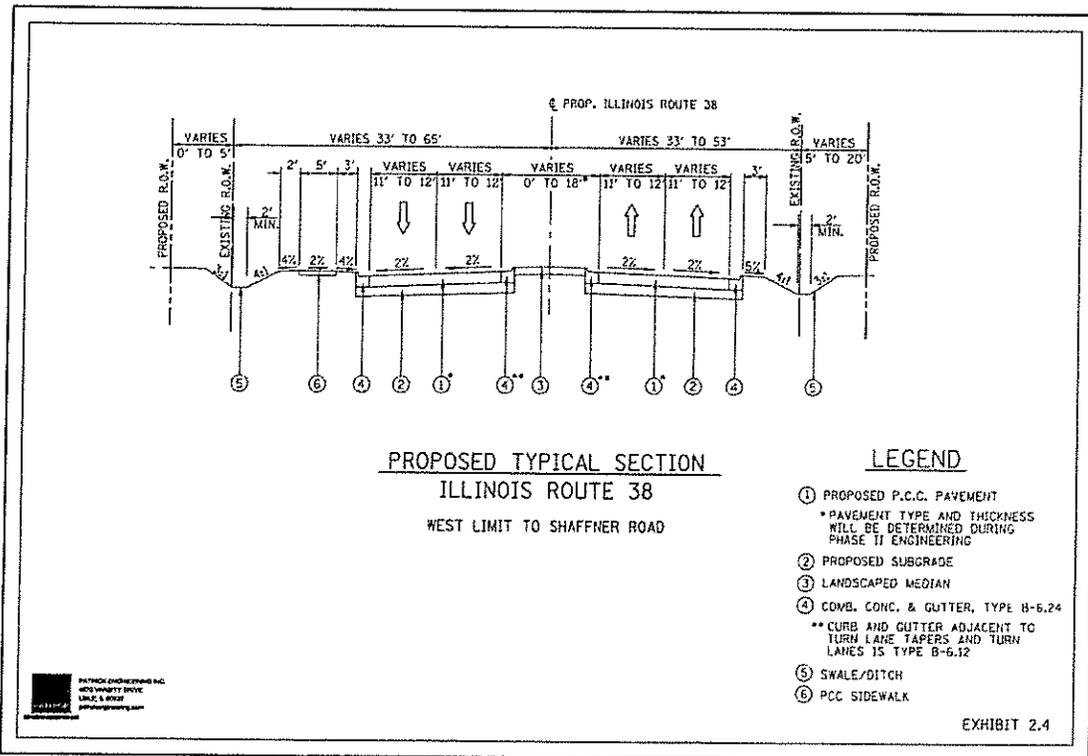
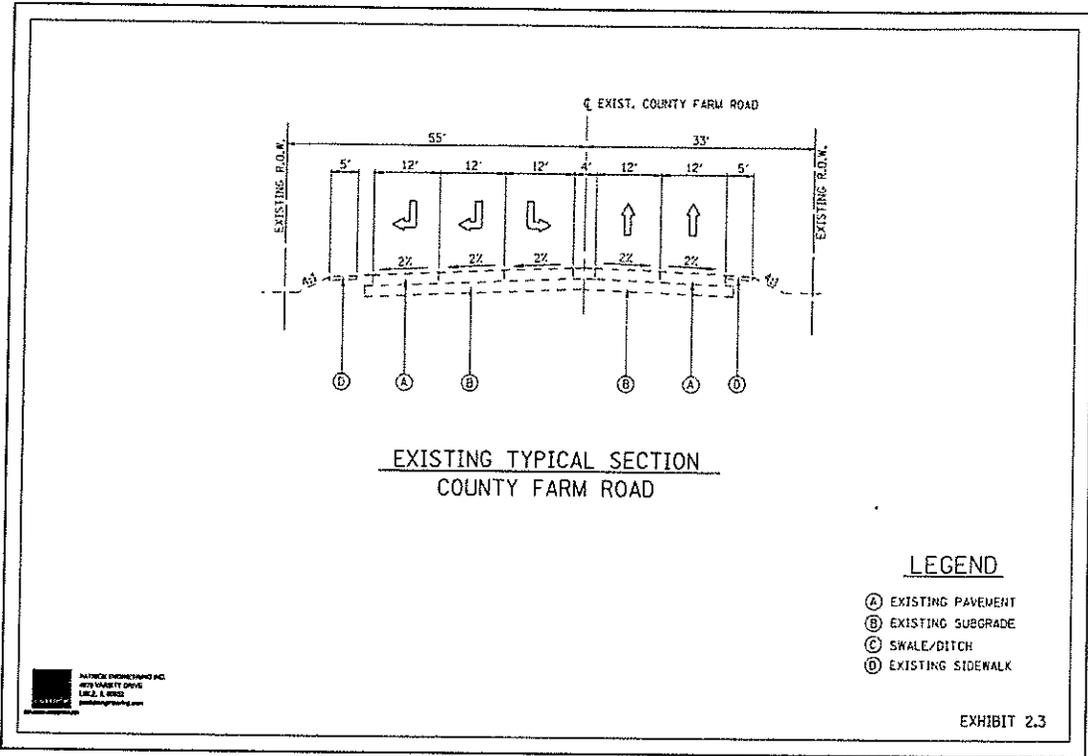


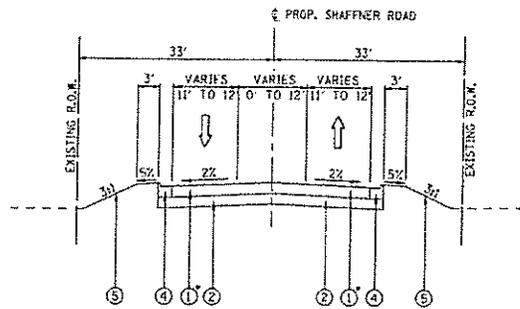
LOCATION MAP

IL RTE 38 (FAP 347) IMPROVEMENTS
SECTION GY-N-1 DU PAGE COUNTY
CONTRACT NO. 60W11

EXHIBIT 1







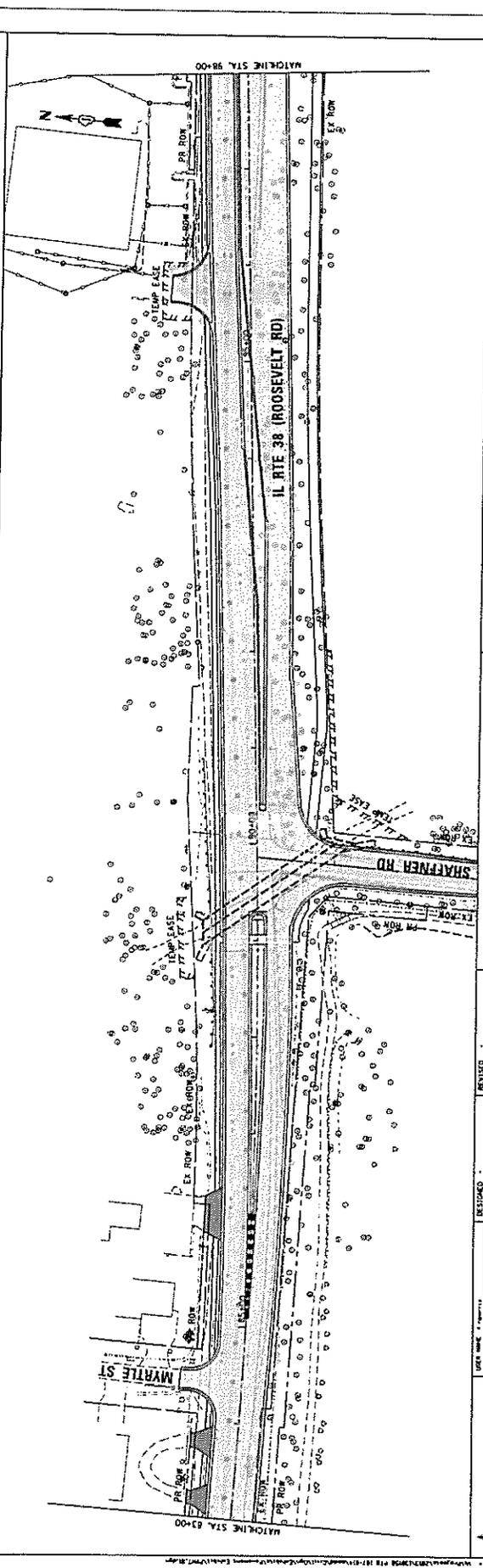
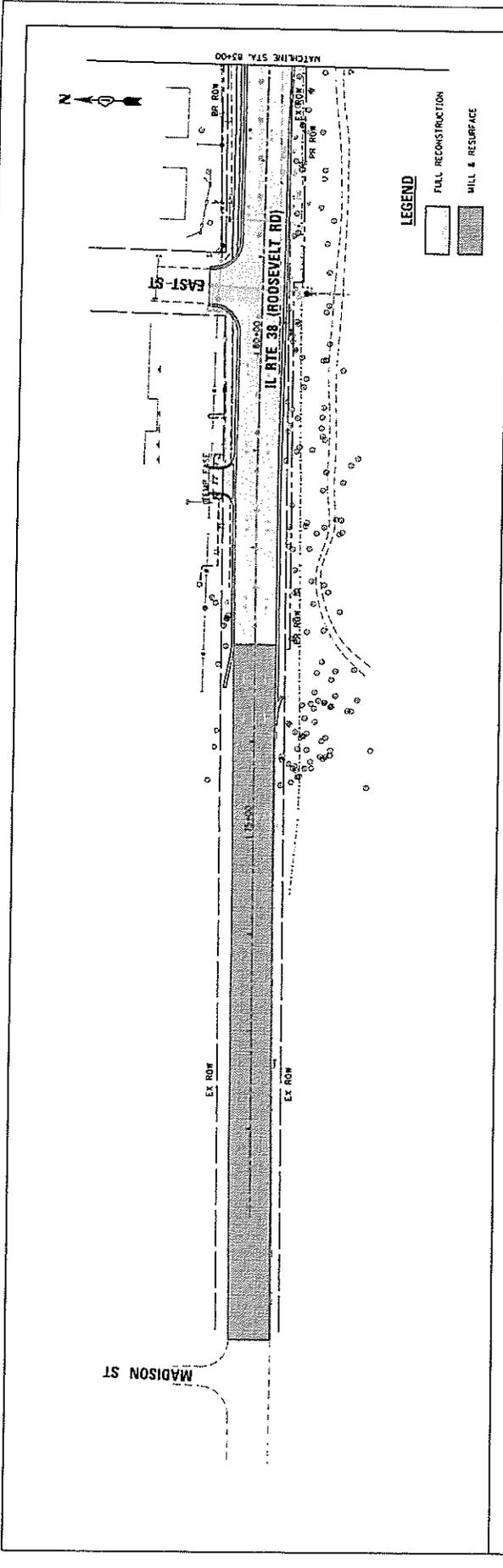
PROPOSED TYPICAL SECTION
SHAFFNER ROAD

LEGEND

- ① PROPOSED P.C.C. PAVEMENT
* PAVEMENT TYPE AND THICKNESS
WILL BE DETERMINED DURING
PHASE II ENGINEERING
- ② PROPOSED SUBGRADE
- ③ LANDSCAPED MEDIAN
- ④ COMB. CONC. & GUTTER, TYPE B-6.24
- ⑤ SWALE/DITCH

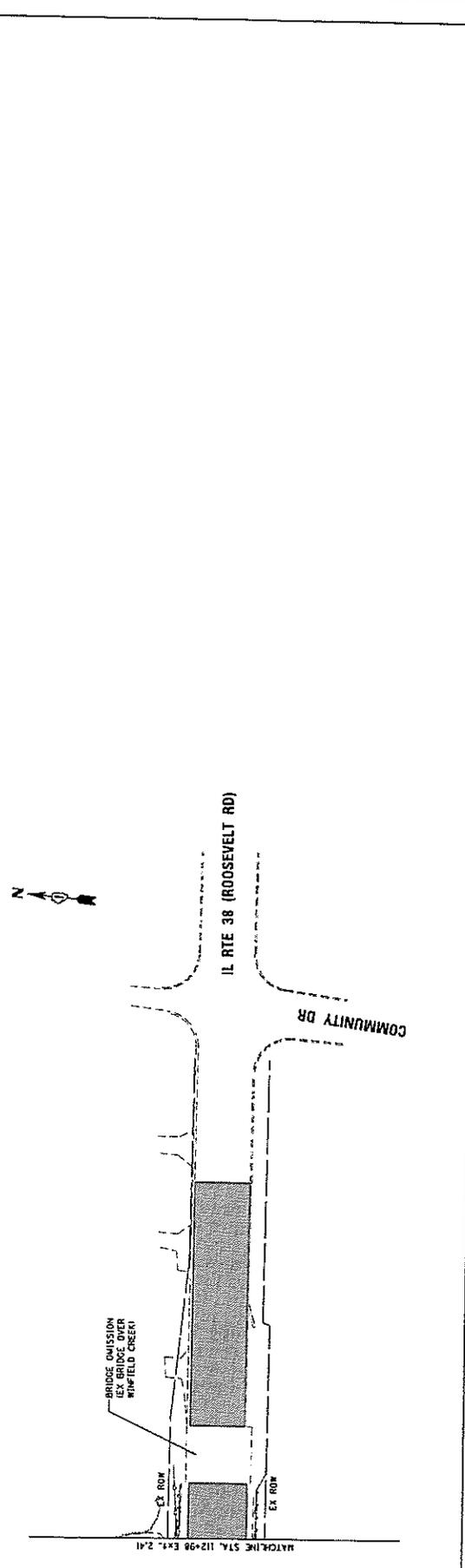
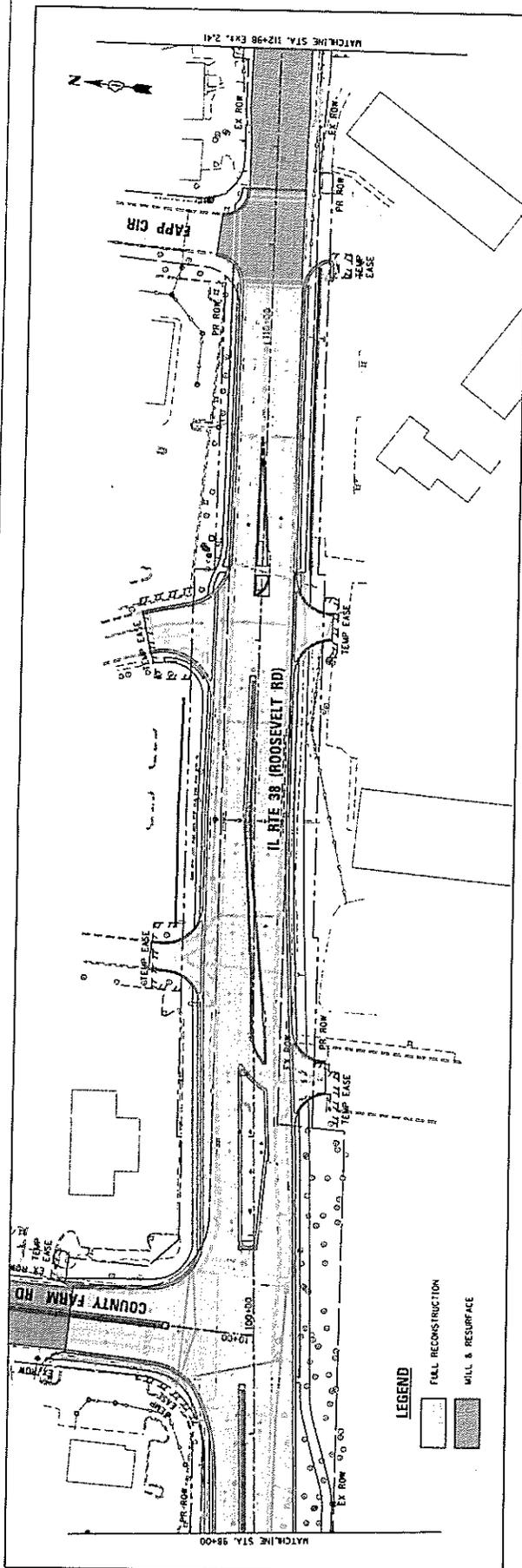

 THE ENGINEERING FIRM INC.
 4875 WINDY HILL
 WILSON, N.C. 27157
 www.theengineeringfirm.com

EXHIBIT 2.7



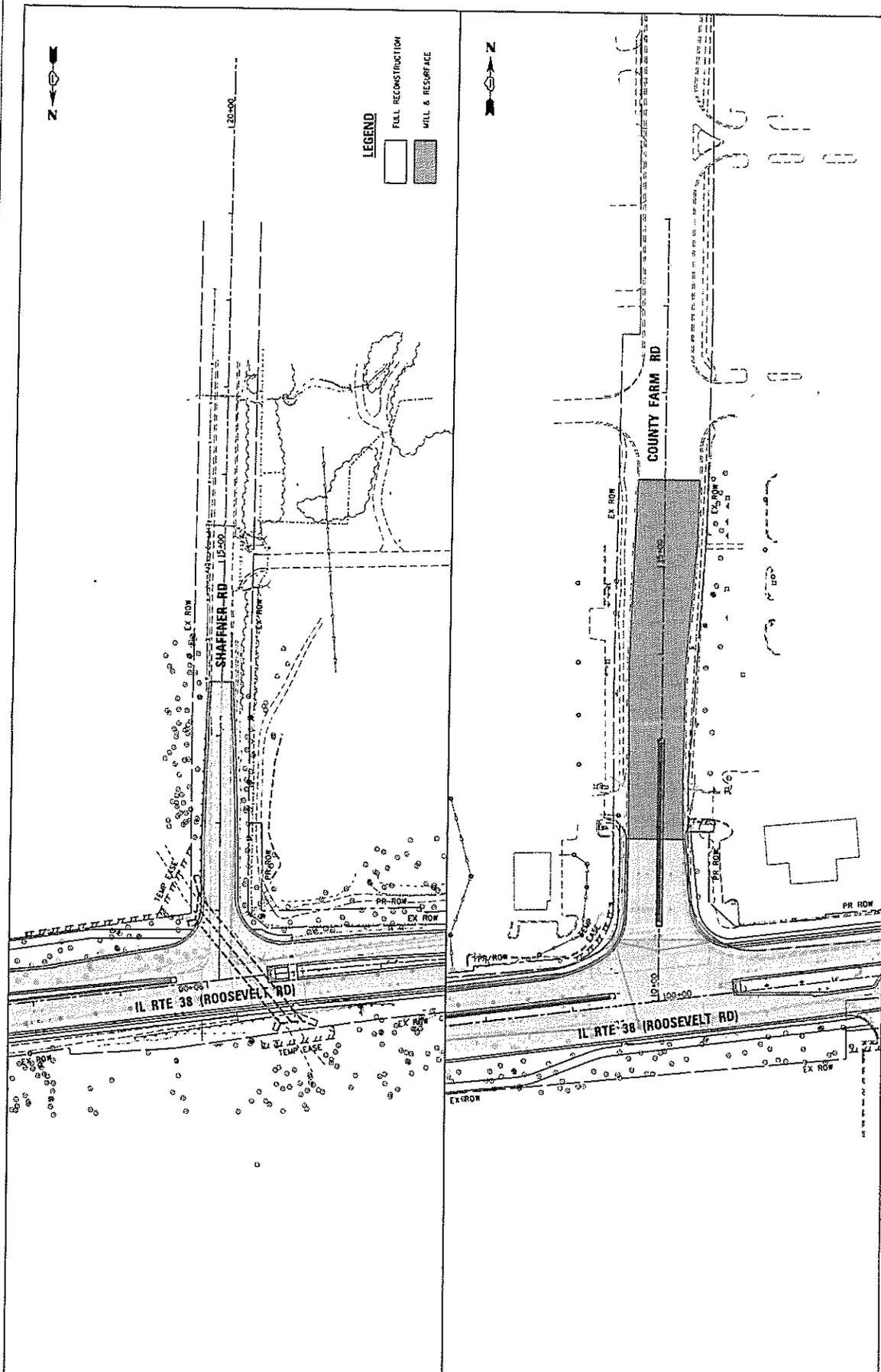
WILKS ENGINEERING ASSOCIATES LTD WILKS ENGINEERING ASSOCIATES LTD 1000 W. 10th Street, Suite 200 Chicago, Illinois 60607-4401 TEL: (312) 462-1100 FAX: (312) 462-1101		SHEET NO. 1 OF 3 SHEETS STA. _____ TO STA. _____		PROPOSED PAVEMENT IMPROVEMENT EXHIBIT IL ROUTE 38		COUNTY _____ DIST. _____ CONTRACT NO. _____ SHEET NO. _____ OF _____ SHEETS	
DESIGNED BY	CHECKED BY	DATE	REVISIONS	SECTION	DATE	NO.	DESCRIPTION
DRUNK	DRUNK	3/27/14	REVISED	CH-1	3/27/14	1	PRELIMINARY TO EXHIBIT
DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION



WPA WILLIAMS COUNTY ASSOCIATES LTD. 1000 W. 10th Street Bismarck, ND 58102	DESIGNED	REVISION	SCALE: 1"=50' SHEET NO. 2 OF 3 SHEETS OF STA. 112+98 TO STA. 113+00	SECTION COUNTY DISTRICT CONTRACT NO.	SHEET NO. 2 OF 3 SHEETS OF STA. 112+98 TO STA. 113+00
	DRAWN CHECKED DATE: 5/12/14	REVISION REVISION REVISION			
STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION			PROPOSED PAVEMENT IMPROVEMENT EXHIBIT IL ROUTE 38		

FILE NO. 112-98-001



WBS WILLIS TOWERS WATKINS ENGINEERS ARCHITECTS 1000 N. MICHIGAN AVE. SUITE 1000 CHICAGO, ILL. 60611 TEL: (312) 236-1000 FAX: (312) 236-1001 WWW.WTTW.COM	DATE MADE: 1/20/14 DATE SCALE: 0/0 DATE DATE: 1/20/14	DESIGNED: [] DRAWN: [] CHECKED: [] DATE: 3/27/14	REVISIONS: NO. 1: [] NO. 2: [] NO. 3: []	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION	SCALE: 1"=50' SHEET NO. 3 OF 3 SHEETS STA. 10+00 TO STA. 10+50	PROJECT: PROPOSED PAVEMENT IMPROVEMENT EXHIBIT SHAFFNER RD & COUNTY FARM RD	COUNTY: [] DISTRICT: [] CONTRACT NO.: 60W11 DIVISION: []	SHEET NO.: [] TOTAL SHEETS: []
---	---	--	--	---	---	--	--	-------------------------------------

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE IL 38
 SECTION GY-N-1
 COUNTY DuPage
 LOCATION at County Farm Road

FACILITY TYPE NON-INTERSTATE

PROJECT LENGTH 3402 FT ==> 0.64 Miles
 # OF CENTERLINES 2 CL
 # OF LANES 4 LANES
 # OF EDGES 4 EP
 LANE WIDTH - AVERAGE 12 FT
 SHOULDER WIDTH HMA Inside 0 FT
 HMA Outside 0 FT
 Total Width of Paved Shoulders 0 FT

PAVEMENT THICKNESS (FLEXIBLE) 11.00 IN 14.75 IN MAX
 SHOULDER THICKNESS 8.00 IN
 POLICY OVERLAY THICKNESS 2.25 IN **Standard Design**

FLEX PAVEMENT	TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
		3.56	5.82	5.82

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	\$78.25 / TON
HMA TOP BINDER	\$70.45 / TON
HMA LOWER BINDER	\$66.90 / TON
HMA BINDER (LEVELING)	\$70.45 / TON
HMA SHOULDER	\$72.00 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
HMA PAVEMENT (FULL-DEPTH)	(11.00")	18,144	SQ YD	\$44.52 /SQ YD	\$0
HMA SURFACE COURSE	(2.00")	18,144	SQ YD *	\$8.85 /SQ YD	\$160,574 ~
HMA TOP BINDER COURSE	(2.25")	18,144	SQ YD *	\$8.97 /SQ YD	\$162,752 ~
HMA LOWER BINDER COURSE	(6.75")	18,144	SQ YD *	\$25.54 /SQ YD	\$463,398 ~
HMA SHOULDER	(8.00")	0	TONS	\$72.00 / TON	\$0 ~
CURB & GUTTER		6,804	LIN FT *	\$30.00 /LIN FT	\$204,120
SUBBASE GRAN MATL TY C (TONS)		113	TONS	\$25.00 / TON	\$2,825
IMPROVED SUBGRADE:	Aggregate (1.5" = 93.7')	20,286	SQ YD	\$7.00 /SQ YD	\$142,002
Reserved For User Supplied Item		0	UNITS	\$0.00 / UNITS	\$0
Reserved For User Supplied Item		0	UNITS	\$0.00 / UNITS	\$0
PAVEMENT REMOVAL		18,144	SQ YD	\$15.00 /SQ YD	\$272,160
SHOULDER REMOVAL		0	SQ YD	\$0.00 /SQ YD	\$0

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST \$1,407,831
 FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE \$89,115

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	UNIT COST
ROUTINE MAINTENANCE ACTIVITY			\$0.00 LANE-MILE / YEAR
HMA OVERLAY PVMT SURF	(2.00")	Surface Mix	\$8.82 /SQ YD
HMA OVERLAY PVMT	(2.25")	Surface Mix	\$9.60 /SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	\$6.61 /SQ YD
HMA BINDER MIX	(0.75")	Leveling Binder Mix	\$3.00 /SQ YD
HMA OVERLAY SHLD (Year 30)	(2.25")	Shoulder Mix	\$9.07 /SQ YD
HMA OVERLAY SHLD	(2.00")	Shoulder Mix	\$8.06 /SQ YD
MILLING (2.00 IN)			\$3.00 /SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill Surf)		Surface Mix	\$78.76 /SQ YD
PARTIAL DEPTH SHLD PATCH (Mill & Fill Surf)		Shoulder Mix	\$78.06 /SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill +2.00")		Leveling Binder Mix	\$77.89 /SQ YD
PARTIAL DEPTH SHLD PATCH (Mill & Fill +2.00")		Shoulder Mix	\$78.06 /SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL			\$2.00 /LIN FT
CENTERLINE JOINT ROUT & SEAL			\$2.00 /LIN FT
RANDOM / THERMAL CRACK ROUT & SEAL (100% Rehab = 110.00' / Station / Lane)			\$2.00 /LIN FT

FLEXIBLE TOTAL LIFE-CYCLE COST \$1,858,036
 FLEXIBLE TOTAL ANNUAL COST PER MILE \$117,613

FULL-DEPTH HMA PAVEMENT
HMA OVERLAY OF RUBBLIZED PCC PAVEMENT
Figure 54-7.C
STANDARD DESIGN

MAINTENANCE COSTS:	ITEM	%	QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
YEAR 5							
	LONG SHLD JT R&S	100.00%	13,608	LIN FT	\$2.00	\$27,216	
	CNTR LINE JOINT R&S	100.00%	6,804	LIN FT	\$2.00	\$13,608	
	RNDM / THRM CRACK R&S	50.00%	7,484	LIN FT	\$2.00	\$14,968	
	PD PVMT PATCH M&F SURF	0.10%	18	SQ YD	\$78.76	\$1,418	
		PWF _n = 0.8626			PW = 0.8626 X	\$57,210	\$49,350
YEAR 10							
	LONG SHLD JT R&S	100.00%	13,608	LIN FT	\$2.00	\$27,216	
	CNTR LINE JOINT R&S	100.00%	6,804	LIN FT	\$2.00	\$13,608	
	RNDM / THRM CRACK R&S	50.00%	7,484	LIN FT	\$2.00	\$14,968	
	PD PVMT PATCH M&F SURF	0.50%	91	SQ YD	\$78.76	\$7,168	
		PWF _n = 0.7441			PW = 0.7441 X	\$62,960	\$46,848
YEAR 15							
	MILL PVMT & SHLD 2.00"	100.00%	18,144	SQ YD	\$3.00	\$54,432	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	181	SQ YD	\$77.89	\$14,098	
	HMA OVERLAY PVMT 2.00"	100.00%	18,144	SQ YD	\$8.82	\$160,118	
	HMA OVERLAY SHLD 2.00"	100.00%	0	SQ YD	\$8.06	\$0	
		PWF _n = 0.6419			PW = 0.6419 X	\$228,648	\$146,760
YEAR 20							
	LONG SHLD JT R&S	100.00%	13,608	LIN FT	\$2.00	\$27,216	
	CNTR LINE JOINT R&S	100.00%	6,804	LIN FT	\$2.00	\$13,608	
	RNDM / THRM CRACK R&S	50.00%	7,484	LIN FT	\$2.00	\$14,968	
	PD PVMT PATCH M&F SURF	0.10%	18	SQ YD	\$78.76	\$1,418	
		PWF _n = 0.5537			PW = 0.5537 X	\$57,210	\$31,676
YEAR 25							
	LONG SHLD JT R&S	100.00%	13,608	LIN FT	\$2.00	\$27,216	
	CNTR LINE JOINT R&S	100.00%	6,804	LIN FT	\$2.00	\$13,608	
	RNDM / THRM CRACK R&S	50.00%	7,484	LIN FT	\$2.00	\$14,968	
	PD PVMT PATCH M&F SURF	0.50%	91	SQ YD	\$78.76	\$7,168	
		PWF _n = 0.4776			PW = 0.4776 X	\$62,960	\$30,070
YEAR 30							
	HMA SD NON-INTERSTATE						
	MILL PVMT & SHLD 2.00"	100.00%	18,144	SQ YD	\$3.00	\$54,432	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	363	SQ YD	\$77.89	\$28,274	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	0	SQ YD	\$78.06	\$0	
	HMA OVERLAY PVMT 2.25"	100.00%	18,144	SQ YD	\$9.60	\$174,267	
	HMA OVERLAY SHLD 2.25"	100.00%	0	SQ YD	\$9.07	\$0	
		PWF _n = 0.4120			PW = 0.4120 X	\$256,973	\$105,869
YEAR 35							
	LONG SHLD JT R&S	100.00%	13,608	LIN FT	\$2.00	\$27,216	
	CNTR LINE JOINT R&S	100.00%	6,804	LIN FT	\$2.00	\$13,608	
	RNDM / THRM CRACK R&S	50.00%	7,484	LIN FT	\$2.00	\$14,968	
	PD PVMT PATCH M&F SURF	0.10%	18	SQ YD	\$78.76	\$1,418	
		PWF _n = 0.3554			PW = 0.3554 X	\$57,210	\$20,331
YEAR 40							
	LONG SHLD JT R&S	100.00%	13,608	LIN FT	\$2.00	\$27,216	
	CNTR LINE JOINT R&S	100.00%	6,804	LIN FT	\$2.00	\$13,608	
	RNDM / THRM CRACK R&S	50.00%	7,484	LIN FT	\$2.00	\$14,968	
	PD PVMT PATCH M&F SURF	0.50%	91	SQ YD	\$78.76	\$7,168	
		PWF _n = 0.3066			PW = 0.3066 X	\$62,960	\$19,301
							\$450,205
	ROUTINE MAINTENANCE ACTIVITY		2.58 Lane Miles		0.00	\$0	\$0
							MAINTENANCE LIFE-CYCLE COST \$450,205
45	YEAR LIFE CYCLE	CRF _n = 0.0407852					MAINTENANCE ANNUAL COST PER MILE \$28,498

PCC PAVEMENT

JPCP

ROUTE IL 38
SECTION GY-N-1
COUNTY DuPage
LOCATION at County Farm Road

FACILITY TYPE NON-INTERSTATE

PROJECT LENGTH 3402 FT ==> 0.64 Miles
OF CENTERLINES 2 CL
OF LANES 4 LANES
OF EDGES 4 EP
LANE WIDTH - AVERAGE 12 FT
SHOULDER WIDTH PCC Inside 0 FT
PCC Outside 0 FT
Total Width of Paved Shoulders 0 FT

PAVEMENT THICKNESS (RIGID) JPCP 9.50 IN TIED SHLD
SHOULDER THICKNESS 9.50 IN

POLICY OVERLAY THICKNESS 2.50 IN

RIGID PAVEMENT	TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
		5.02	7.79	7.79
Worksheet Construction Type is	Reconstruction		The Pavement Type is	JPCP

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
JPC PAVEMENT	(9.50")	18,144	SQ YD	\$43.61 /SQ YD	\$791,260
PAVEMENT REINFORCEMENT		0	SQ YD	\$22.00 /SQ YD	\$0
STABILIZED SUBBASE	(4.00")	0	SQ YD	\$19.00 /SQ YD	\$0
PCC SHOULDERS	(9.50" to 9.50")	0	SQ YD	\$40.00 /SQ YD	\$0
CURB & GUTTER		6,804	LIN FT	\$30.00 /LIN FT	\$204,120
SUBBASE GRAN MATL TY C	(- 0.00")	0	TONS	\$25.00 /TON	\$0
IMPROVED SUBGRADE:	Aggregate (Depth = 50.0)	18,900	SQ YD	\$7.00 /SQ YD	\$132,300
Reserved For User Supplied Item		0	UNITS	\$0.00 /UNITS	\$0
Reserved For User Supplied Item		0	UNITS	\$0.00 /UNITS	\$0
PAVEMENT REMOVAL		18,144	SQ YD	\$15.00 /SQ YD	\$272,160
SHOULDER REMOVAL		0	SQ YD	\$0.00 /SQ YD	\$0

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST \$1,399,840
RIGID CONSTRUCTION ANNUAL COST PER MILE \$88,610

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	T	UNIT COST
ROUTINE MAINTENANCE ACTIVITY				\$0.00 /LANE-MILE / YEAR
HMA POLICY OVERLAY	(2.50")		2.50	
HMA POLICY OVERLAY PVMT	(2.50")	1.0007	2.50	\$10.61 /SQ YD
HMA SURFACE MIX	(1.50")	1.0002	1.50	\$6.61 /SQ YD
HMA BINDER MIX	(1.00")	1.0100	1.00	\$4.00 /SQ YD
HMA POLICY OVERLAY SHLD	(2.50")		2.50	\$10.08 /SQ YD
CLASS A PAVEMENT PATCHING				\$195.00 /SQ YD
CLASS B PAVEMENT PATCHING				\$150.00 /SQ YD
CLASS C SHOULDER PATCHING				\$145.00 /SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)		Surface Mix	1.50	\$76.57 /SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")		Surface Mix	2.50	\$80.96 /SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL				\$2.00 /LIN FT
CENTERLINE JOINT ROUT & SEAL				\$2.00 /LIN FT
REFLECTIVE TRANSVERSE CRACK ROUT & SEAL				\$2.00 /LIN FT
RANDOM CRACK ROUT & SEAL	(100% Rehab = 100.00' / Station / Lane)			\$2.00 /LIN FT

RIGID TOTAL LIFE-CYCLE COST \$1,671,293
RIGID TOTAL ANNUAL COST PER MILE \$105,792

JOINTED PLAIN CONCRETE PAVEMENT
UNBONDED JOINTED PLAIN CONCRETE OVERLAY
Figure 54-7.A

MAINTENANCE COSTS:	ITEM	%	QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
YEAR 10							
	PAVEMENT PATCH CLASS B	0.10%	18	SQ YD	\$150.00	\$2,700	
		PWF _n = 0.7441			PW = 0.7441 X	\$2,700	\$2,009
YEAR 15							
	PAVEMENT PATCH CLASS B	0.20%	36	SQ YD	\$150.00	\$5,400	
		PWF _n = 0.6419			PW = 0.6419 X	\$5,400	\$3,466
YEAR 20							
	PAVEMENT PATCH CLASS B	2.00%	363	SQ YD	\$150.00	\$54,450	
	SHOULDER PATCH CLASS C	0.50%	0	SQ YD	\$145.00	\$0	
	LONGITUDINAL SHLD JT R&S	100.00%	13,608	LIN FT	\$2.00	\$27,216	
	CENTERLINE JT R&S	100.00%	6,804	LIN FT	\$2.00	\$13,608	
		PWF _n = 0.5537			PW = 0.5537 X	\$95,274	\$52,751
YEAR 25							
	PAVEMENT PATCH CLASS B	3.00%	544	SQ YD	\$150.00	\$81,600	
	SHOULDER PATCH CLASS C	1.00%	0	SQ YD	\$145.00	\$0	
		PWF _n = 0.4776			PW = 0.4776 X	\$81,600	\$38,973
YEAR 30 NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	726	SQ YD	\$150.00	\$108,900	
	SHOULDER PATCH CLASS C	1.50%	0	SQ YD	\$145.00	\$0	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	18,144	SQ YD	\$10.61	\$192,458	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	0	SQ YD	\$10.08	\$0	
		PWF _n = 0.4120			PW = 0.4120 X	\$301,358	\$124,156
YEAR 35 NON-INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	13,608	LIN FT	\$2.00	\$27,216	
	CENTERLINE JT R&S	100.00%	6,804	LIN FT	\$2.00	\$13,608	
	RANDOM CRACK R&S	50.00%	6,804	LIN FT	\$2.00	\$13,608	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	4,358	LIN FT	\$2.00	\$8,716	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	18	SQ YD	\$80.96	\$1,457	
		PWF _n = 0.3554			PW = 0.3554 X	\$64,605	\$22,960
YEAR 40 NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	91	SQ YD	\$150.00	\$13,650	
	LONGITUDINAL SHLD JT R&S	100.00%	13,608	LIN FT	\$2.00	\$27,216	
	CENTERLINE JT R&S	100.00%	6,804	LIN FT	\$2.00	\$13,608	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	6,538	LIN FT	\$2.00	\$13,076	
	RANDOM CRACK R&S	50.00%	6,804	LIN FT	\$2.00	\$13,608	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	91	SQ YD	\$80.96	\$7,367	
		PWF _n = 0.3066			PW = 0.3066 X	\$88,525	\$27,138
							\$271,453
	ROUTINE MAINTENANCE ACTIVITY		2.58	Lane Miles	\$0.00	\$0	\$0
							MAINTENANCE LIFE-CYCLE COST \$271,453
45	YEAR LIFE CYCLE	CRF _n = 0.0407852					MAINTENANCE ANNUAL COST PER MILE \$17,183

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 7/17/14 8:33 AM

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	\$1,399,840	\$1,407,831
		ANNUAL COST PER MILE	\$88,610	\$89,115
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	\$271,453	\$450,205
		ANNUAL COST PER MILE	\$17,183	\$28,498
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	\$1,671,293	\$1,858,036
		ANNUAL COST PER MILE	\$105,792	\$117,613

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	=====>	JPCP	\$105,792	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	HMA	\$117,613	11.2%

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: **Shaffner Road** Comments: **Phase II Coordination with BDE Required**

Section: **GY-N-1** Design Date: **05/19/2014** ONP <-- BY

County: **DuPage** Modify Date: <-- BY

Location: **at IL 38**

Facility Type: **Unmarked State Route**

of Lanes = **2 or 3**

Part of future 4 lanes or more? **No**

One Way Street? **No**

Road Class: **II**

Subgrade Support Rating (SSR): **Poor**

Construction Year: **2015**

Design Period (DP) = **20** years

	ADT	Year
Current:	2,450	2012
Future:	2,800	2040

	Structural Design Traffic			% of ADT in Design Lane
	Minimum ADT	Actual ADT	Actual %of Total ADT	
PV =	No Min	2,518	96.4%	P = 50%
SU =	No Min	52	2.0%	S = 50%
MU =	No Min	42	1.6%	M = 50%
Struct. Design ADT =	2,613 (2025)			

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT		RIGID PAVEMENT	
Cpv =	0.15	Cpv =	0.15
Csu =	112.06	Csu =	135.78
Cmu =	385.44	Cmu =	567.21
TF flexible (Actual) =	0.22 (Actual ADT)	TF rigid (Actual) =	0.31 (Actual ADT)
TF flexible (Min) =	No Min (Min ADT Fig. 54-2.C)	TF rigid (Min) =	No Min (Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement	JPC Pavement
Use TF flexible = 0.50 Per BDE 54-5.01(i)-1g	Use TF rigid = 0.31
PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.R)	Edge Support = Tied Shoulder or C.&G.
HMA Mixture Temp. = 75.0 deg. F (Fig. 54-5.C)	Rigid Pavt Thick. = 7.50 in. (Fig. 54-4.E)
Design HMA Mixture Modulus (E _{HMA}) = 690 ksi (Fig. 54-5.D)	
Design HMA Strain (ε _{HMA}) = 147 (Fig. 54-5.E)	
Full Depth HMA Design Thickness = 7.25 in. (Fig. 54-5.F)	CRC Pavement
Limiting Strain Criterion Thickness = 14.75 in. (Fig. 54-5.I)	Use TF rigid = 0.31
Use Full-Depth HMA Thickness = 7.25 inches	IBR value = 3
	CRCP Thickness = 5.00 in. (Fig. 54-4.N)

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC	Unbonded Concrete Overlay
Use TF flexible = 0.50	Review 54-4.03 for limitations and special considerations.
HMA Overlay Design Thickness = 4.75 in. (Fig. 54-5.U)	
Limiting Strain Criterion Thickness = in. (Fig. 54-5.V)	
Use HMA Overlay Thickness = 999.00 inches	JPCP Thickness = NA inches

CONTACT BMPR FOR ASSISTANCE

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

Class I Roads	Class II Roads	Class III Roads	Class IV Roads
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500	2 lanes with ADT > 2000 One way Street with ADT <= 3500	2 Lanes (ADT 750 -2000)	2 Lanes (ADT < 750)

Facility Type	Min. Str. Design Traffic (Fig 54-2.C)		
	PV	SU	MU
Interstate or Freeway	0	500	1500
Other Marked State Route	0	250	750
Unmarked State Route	No Min	No Min	No Min

Class	Traffic Factor ESAL Coefficients			
	Rigid (Fig. 54-4.C)		Flexible (Fig. 54-5.B)	
I	Csu	Cmu	Csu	Cmu
II	143.81	696.42	132.50	482.53
III	135.78	567.21	112.06	385.44
IV	129.58	562.47	109.14	384.35
	129.58	562.47	109.14	384.35

ADT	Class Table for One-Way Streets	
	ADT	Class
0 - 3500		II
>3501		I

ADT	Class Table for 2 or 3 lanes (not future 4 lane & not one-way street)	
	ADT	Class
0 - 749		IV
750 - 2000		III
>2000		II

Number of Lanes	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B)					
	Rural			Urban		
	P	S	M	P	S	M
1 Lane Ramp	100%	100%	100%	100%	100%	100%
2 or 3	50%	50%	50%	50%	50%	50%
4	32%	45%	45%	32%	45%	45%
6 or more	20%	40%	40%	8%	37%	37%

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION

FULL-DEPTH HMA PAVEMENT

Standard Design

ROUTE SECTION COUNTY LOCATION
 Shaffner Road GY-N-1 DuPage at IL 38

FACILITY TYPE NON-INTERSTATE

PROJECT LENGTH 250 FT ==> 0.05 Miles
 # OF CENTERLINES 1 CL
 # OF LANES 2 LANES
 # OF EDGES 2 EP
 LANE WIDTH - AVERAGE 12 FT
 SHOULDER WIDTH HMA Left 0 FT
 HMA Right 0 FT
 Total Width of Paved Shoulders 0 FT

PAVEMENT THICKNESS (FLEXIBLE) 7.25 IN 14.75 IN MAX
 SHOULDER THICKNESS 8.00 IN
 POLICY OVERLAY THICKNESS 2.25 IN

FLEX PAVEMENT	TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
		No Min	0.22	0.22

Read Me!

HMA COST PER TON	UNIT PRICE
HMA SURFACE	\$114.02 / TON
HMA TOP BINDER	\$96.78 / TON
HMA LOWER BINDER	\$82.91 / TON
HMA BINDER (LEVELING)	\$96.78 / TON
HMA SHOULDER	\$72.00 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
HMA PAVEMENT (FULL-DEPTH)	(7.25")	667	SQ YD	\$39.80 /SQ YD	\$0
HMA SURFACE COURSE	(2.00")	667	SQ YD	\$13.89 /SQ YD	\$9,260 ~
HMA TOP BINDER COURSE	(2.25")	667	SQ YD	\$13.29 /SQ YD	\$8,860 ~
HMA LOWER BINDER COURSE	(3.00")	667	SQ YD	\$15.12 /SQ YD	\$10,080 ~
HMA SHOULDER	(8.00")	0	TONS	\$72.00 / TON	\$0 ~
CURB & GUTTER		500	LIN FT	\$30.00 /LIN FT	\$15,000
SUBBASE GRAN MATL TY C (TONS)		0	TONS	\$25.00 / TON	\$0
IMPROVED SUBGRADE: Aggregate		728	SQ YD	\$7.00 /SQ YD	\$5,096
Reserved For User Supplied Item		0	UNITS	\$0.00 /UNITS	\$0
Reserved For User Supplied Item		0	UNITS	\$0.00 /UNITS	\$0
PAVEMENT REMOVAL		667	SQ YD	\$15.00 /SQ YD	\$10,005
SHOULDER REMOVAL		0	SQ YD	\$10.00 /SQ YD	\$0
Note: * Denotes User Supplied Quantity					
FLEXIBLE CONSTRUCTION INITIAL COST					\$58,301
FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE					\$50,219

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	UNIT COST
ROUTINE MAINTENANCE ACTIVITY			\$0.00 LANE-MILE / YEAR
HMA OVERLAY PVMT SURF	(2.00")	Surface Mix	\$12.86 /SQ YD
HMA OVERLAY PVMT	(2.25")	Surface Mix	\$13.75 /SQ YD
HMA SURFACE MIX	(1.50")	Surface Mix	\$9.63 /SQ YD
HMA BINDER MIX	(0.75")	Leveling Binder Mix	\$4.12 /SQ YD
HMA OVERLAY SHLD (Year 30)	(2.25")	Shoulder Mix	\$9.07 /SQ YD
HMA OVERLAY SHLD	(2.00")	Shoulder Mix	\$8.06 /SQ YD
MILLING (2.00 IN)			\$3.00 /SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill Surf)		Surface Mix	\$82.77 /SQ YD
PARTIAL DEPTH SHLD PATCH (Mill & Fill Surf)		Shoulder Mix	\$78.06 /SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill +2.00")		Leveling Binder Mix	\$80.84 /SQ YD
PARTIAL DEPTH SHLD PATCH (Mill & Fill +2.00")		Shoulder Mix	\$78.06 /SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL			\$2.00 / LIN FT
CENTERLINE JOINT ROUT & SEAL			\$2.00 / LIN FT
RANDOM / THERMAL CRACK ROUT & SEAL (100% Rehab = 110.00' / Station / Lane)			\$2.00 / LIN FT

FLEXIBLE TOTAL LIFE-CYCLE COST \$77,775
 FLEXIBLE TOTAL ANNUAL COST PER MILE \$66,994

FULL-DEPTH HMA PAVEMENT
 HMA OVERLAY OF RUBBLIZED PCC PAVEMENT
 Figure 54-7.C
 STANDARD DESIGN

MAINTENANCE COSTS:	ITEM	%	QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
YEAR 5							
	LONG SHLD JT R&S	100.00%	500	LIN FT	\$2.00	\$1,000	
	CNTR LINE JOINT R&S	100.00%	250	LIN FT	\$2.00	\$500	
	RNDM / THRM CRACK R&S	50.00%	275	LIN FT	\$2.00	\$550	
	PD PVMT PATCH M&F SURF	0.10%	1	SQ YD	\$82.77	\$83	
	PWFn =	0.8626		PW =	0.8626 X	\$2,133	\$1,840
YEAR 10							
	LONG SHLD JT R&S	100.00%	500	LIN FT	\$2.00	\$1,000	
	CNTR LINE JOINT R&S	100.00%	250	LIN FT	\$2.00	\$500	
	RNDM / THRM CRACK R&S	50.00%	275	LIN FT	\$2.00	\$550	
	PD PVMT PATCH M&F SURF	0.50%	3	SQ YD	\$82.77	\$248	
	PWFn =	0.7441		PW =	0.7441 X	\$2,298	\$1,710
YEAR 15							
	MILL PVMT & SHLD 2.00"	100.00%	667	SQ YD	\$3.00	\$2,001	
	PD PVMT PATCH M&F ADD'L 2.00"	1.00%	7	SQ YD	\$80.84	\$566	
	HMA OVERLAY PVMT 2.00"	100.00%	667	SQ YD	\$12.86	\$8,573	
	HMA OVERLAY SHLD 2.00"	100.00%	0	SQ YD	\$8.06	\$0	
	PWFn =	0.6419		PW =	0.6419 X	\$11,140	\$7,150
YEAR 20							
	LONG SHLD JT R&S	100.00%	500	LIN FT	\$2.00	\$1,000	
	CNTR LINE JOINT R&S	100.00%	250	LIN FT	\$2.00	\$500	
	RNDM / THRM CRACK R&S	50.00%	275	LIN FT	\$2.00	\$550	
	PD PVMT PATCH M&F SURF	0.10%	1	SQ YD	\$82.77	\$83	
	PWFn =	0.5537		PW =	0.5537 X	\$2,133	\$1,181
YEAR 25							
	LONG SHLD JT R&S	100.00%	500	LIN FT	\$2.00	\$1,000	
	CNTR LINE JOINT R&S	100.00%	250	LIN FT	\$2.00	\$500	
	RNDM / THRM CRACK R&S	50.00%	275	LIN FT	\$2.00	\$550	
	PD PVMT PATCH M&F SURF	0.50%	3	SQ YD	\$82.77	\$248	
	PWFn =	0.4776		PW =	0.4776 X	\$2,298	\$1,098
HMA_SD							
YEAR 30							
	NON-INTERSTATE						
	MILL PVMT & SHLD 2.00"	100.00%	667	SQ YD	\$3.00	\$2,001	
	PD PVMT PATCH M&F ADD'L 2.00"	2.00%	13	SQ YD	\$80.84	\$1,051	
	PD SHLD PATCH M&F ADD'L 2.00"	1.00%	0	SQ YD	\$78.06	\$0	
	HMA OVERLAY PVMT 2.25"	100.00%	667	SQ YD	\$13.75	\$9,164	
	HMA OVERLAY SHLD 2.25"	100.00%	0	SQ YD	\$9.07	\$0	
	PWFn =	0.4120		PW =	0.4120 X	\$12,216	\$5,033
YEAR 35							
	LONG SHLD JT R&S	100.00%	500	LIN FT	\$2.00	\$1,000	
	CNTR LINE JOINT R&S	100.00%	250	LIN FT	\$2.00	\$500	
	RNDM / THRM CRACK R&S	50.00%	275	LIN FT	\$2.00	\$550	
	PD PVMT PATCH M&F SURF	0.10%	1	SQ YD	\$82.77	\$83	
	PWFn =	0.3554		PW =	0.3554 X	\$2,133	\$758
YEAR 40							
	LONG SHLD JT R&S	100.00%	500	LIN FT	\$2.00	\$1,000	
	CNTR LINE JOINT R&S	100.00%	250	LIN FT	\$2.00	\$500	
	RNDM / THRM CRACK R&S	50.00%	275	LIN FT	\$2.00	\$550	
	PD PVMT PATCH M&F SURF	0.50%	3	SQ YD	\$82.77	\$248	
	PWFn =	0.3066		PW =	0.3066 X	\$2,298	\$704
							\$19,474
ROUTINE MAINTENANCE ACTIVITY			0.09	Lane Miles	0.00	\$0	\$0
						MAINTENANCE LIFE-CYCLE COST	\$19,474
45	YEAR LIFE CYCLE	CRFn = 0.0407852	MAINTENANCE ANNUAL COST PER MILE				\$16,775

PCC PAVEMENT

JPCP

ROUTE **Shaffner Road**
 SECTION **GY-N-1**
 COUNTY **DuPage**
 LOCATION **at IL 38**

FACILITY TYPE **NON-INTERSTATE**

PROJECT LENGTH **250 FT ==>** 0.05 Miles
 # OF CENTERLINES **1 CL**
 # OF LANES **2 LANES**
 # OF EDGES **2 EP**
 LANE WIDTH - AVERAGE **12 FT**
 SHOULDER WIDTH PCC Left **0 FT**
 PCC Right **0 FT**
 Total Width of Paved Shoulders **0 FT**

PAVEMENT THICKNESS (RIGID) **JPCP 7.50 IN TIED SHLD**
 SHOULDER THICKNESS **7.50 IN**

POLICY OVERLAY THICKNESS **2.50 IN**

RIGID PAVEMENT TRAFFIC FACTORS		MINIMUM	ACTUAL	USE
Worksheet Construction Type is	Reconstruction	No Min	0.31	0.31
			The Pavement Type is	JPCP

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
JPC PAVEMENT	(7.50")	667	SQ YD	\$43.45 /SQ YD	\$28,981
PAVEMENT REINFORCEMENT		0	SQ YD	\$22.00 /SQ YD	\$0
STABILIZED SUBBASE	(4.00")	0	SQ YD	\$19.00 /SQ YD	\$0
PCC SHOULDERS	(7.50" to 7.50")	0	SQ YD	\$40.00 /SQ YD	\$0
CURB & GUTTER		500	LIN FT	\$30.00 /LIN FT	\$15,000
SUBBASE GRAN MATL TY C	(- 0.00")	0	TONS	\$25.00 /TON	\$0
IMPROVED SUBGRADE:	Aggregate	694	SQ YD	\$7.00 /SQ YD	\$4,858
Reserved For User Supplied Item		0	UNITS	\$0.00 /UNITS	\$0
Reserved For User Supplied Item		0	UNITS	\$0.00 /UNITS	\$0
PAVEMENT REMOVAL		667	SQ YD	\$15.00 /SQ YD	\$10,005
SHOULDER REMOVAL		0	SQ YD	\$10.00 /SQ YD	\$0

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST **\$58,844**
 RIGID CONSTRUCTION ANNUAL COST PER MILE **\$50,687**

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	UNIT	UNIT COST
ROUTINE MAINTENANCE ACTIVITY				\$0.00 /LANE-MILE /YEAR
HMA POLICY OVERLAY	(2.50")		2.50	
HMA POLICY OVERLAY PVMT	(2.50")	1.0087	2.50	\$15.12 /SQ YD
HMA SURFACE MIX	(1.50")	1.0002	1.50	\$9.63 /SQ YD
HMA BINDER MIX	(1.00")	1.0135	1.00	\$5.49 /SQ YD
HMA POLICY OVERLAY SHLD	(2.50")		2.50	\$10.08 /SQ YD
CLASS A PAVEMENT PATCHING				\$195.00 /SQ YD
CLASS B PAVEMENT PATCHING				\$150.00 /SQ YD
CLASS C SHOULDER PATCHING				\$145.00 /SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)		Surface Mix	1.50	\$79.58 /SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")		Surface Mix	2.50	\$85.96 /SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL				\$2.00 /LIN FT
CENTERLINE JOINT ROUT & SEAL				\$2.00 /LIN FT
REFLECTIVE TRANSVERSE CRACK ROUT & SEAL				\$2.00 /LIN FT
RANDOM CRACK ROUT & SEAL	(100% Rehab = 100.00' / Station / Lane)			\$2.00 /LIN FT

RIGID TOTAL LIFE-CYCLE COST **\$70,054**
 RIGID TOTAL ANNUAL COST PER MILE **\$60,343**

MAINTENANCE AND REHABILITATION ACTIVITY SCHEDULE

11/10/14

JOINTED PLAIN CONCRETE PAVEMENT
UNBONDED JOINTED PLAIN CONCRETE OVERLAY
Figure 54-7.A

MAINTENANCE COSTS:	ITEM	%	QUANTITY	UNIT	UNIT COST	COST	PRESENT WORTH
YEAR 10							
	PAVEMENT PATCH CLASS B	0.10%	1	SQ YD	\$150.00	\$150	
		PWFn = 0.7441			PW = 0.7441 X	\$150	\$112
YEAR 15							
	PAVEMENT PATCH CLASS B	0.20%	1	SQ YD	\$150.00	\$150	
		PWFn = 0.6419			PW = 0.6419 X	\$150	\$96
YEAR 20							
	PAVEMENT PATCH CLASS B	2.00%	13	SQ YD	\$150.00	\$1,950	
	SHOULDER PATCH CLASS C	0.50%	0	SQ YD	\$145.00	\$0	
	LONGITUDINAL SHLD JT R&S	100.00%	500	LIN FT	\$2.00	\$1,000	
	CENTERLINE JT R&S	100.00%	250	LIN FT	\$2.00	\$500	
		PWFn = 0.5537			PW = 0.5537 X	\$3,450	\$1,910
YEAR 25							
	PAVEMENT PATCH CLASS B	3.00%	20	SQ YD	\$150.00	\$3,000	
	SHOULDER PATCH CLASS C	1.00%	0	SQ YD	\$145.00	\$0	
		PWFn = 0.4776			PW = 0.4776 X	\$3,000	\$1,433
YEAR 30 NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	4.00%	27	SQ YD	\$150.00	\$4,050	
	SHOULDER PATCH CLASS C	1.50%	0	SQ YD	\$145.00	\$0	
	HMA POLICY OVERLAY 2.5" (PVMT)	100.00%	667	SQ YD	\$15.12	\$10,082	
	HMA POLICY OVERLAY 2.5" (SHLD)	100.00%	0	SQ YD	\$10.08	\$0	
		PWFn = 0.4120			PW = 0.4120 X	\$14,132	\$5,822
YEAR 35 NON-INTERSTATE							
	LONGITUDINAL SHLD JT R&S	100.00%	500	LIN FT	\$2.00	\$1,000	
	CENTERLINE JT R&S	100.00%	250	LIN FT	\$2.00	\$500	
	RANDOM CRACK R&S	50.00%	250	LIN FT	\$2.00	\$500	
	REFLECTIVE TRANSVERSE CRACK R&S	40.00%	163	LIN FT	\$2.00	\$326	
	PD PVMT PATCH M&F HMA 2.50"	0.10%	1	SQ YD	\$85.96	\$86	
		PWFn = 0.3554			PW = 0.3554 X	\$2,412	\$857
YEAR 40 NON-INTERSTATE							
	PAVEMENT PATCH CLASS B	0.50%	3	SQ YD	\$150.00	\$450	
	LONGITUDINAL SHLD JT R&S	100.00%	500	LIN FT	\$2.00	\$1,000	
	CENTERLINE JT R&S	100.00%	250	LIN FT	\$2.00	\$500	
	REFLECTIVE TRANSVERSE CRACK R&S	60.00%	245	LIN FT	\$2.00	\$490	
	RANDOM CRACK R&S	50.00%	250	LIN FT	\$2.00	\$500	
	PD PVMT PATCH M&F HMA 2.50"	0.50%	3	SQ YD	\$85.96	\$258	
		PWFn = 0.3066			PW = 0.3066 X	\$3,198	\$980
							\$11,210
	ROUTINE MAINTENANCE ACTIVITY		0.09	Lane Miles	\$0.00	\$0	\$0
							MAINTENANCE LIFE-CYCLE COST \$11,210
45	YEAR LIFE CYCLE	CRFn = 0.0407852					MAINTENANCE ANNUAL COST PER MILE \$9,656

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised : 7/17/14 11:07 AM

			JPCP	HMA
CONSTRUCTION	INITIAL COST	PRESENT WORTH	\$58,844	\$58,301
		ANNUAL COST PER MILE	\$50,687	\$50,219
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH	\$11,210	\$19,474
		ANNUAL COST PER MILE	\$9,656	\$16,775
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	\$70,054	\$77,775
		ANNUAL COST PER MILE	\$60,343	\$66,994

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	=====>	JPCP	\$60,343	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	HMA	\$66,994	11.0%